

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

Claims 1-28. Canceled.

Claim 29. (Currently Amended) An isolated DNA molecule comprising a nucleotide sequence encoding ~~an~~ the N-methyl transferase of SEQ ID NO:1 and having the N-methyl transferase enzyme activities of 7-methylxanthine N3 methyl transferase, theobromine N1 methyl transferase, and paraxanthine N3 methyl transferase.

Claim 30. (Currently Amended) An isolated DNA molecule comprising a modified nucleotide sequence having at least 90% identity to the ~~nucleotide sequence of Claim 29~~ a nucleotide sequence encoding the N-methyl transferase of SEQ ID NO:1 and having the N-methyl transferase enzyme activities of 7-methylxanthine N3 methyl transferase, theobromine N1 methyl transferase, and paraxanthine N3 methyl transferase, where the polypeptide encoded by said modified nucleotide sequence maintains all of said N-methyl transferase enzyme activities.

- Claim 31. (Previously Presented) The isolated DNA molecule of claim 30, wherein said modified nucleotide sequence encodes the N-methyl transferase of SEQ ID NO:1.
- Claim 32. Canceled.
- Claim 33. (Previously Presented) The isolated DNA molecule of claim 29, wherein said isolated DNA molecule consists of SEQ ID NO:2.
- Claim 34. (Currently Amended) An isolated RNA molecule comprising a nucleotide sequence encoding an the N-methyl transferase of SEQ ID NO:1 and having the N-methyl transferase enzyme activities of 7-methylxanthine N3 methyl transferase, theobromine N1 methyl transferase, and paraxanthine N3 methyl transferase.
- Claim 35. (Currently Amended) An isolated RNA molecule comprising a modified nucleotide sequence having at least 90% identity to ~~the nucleotide sequence of Claim 34~~ a nucleotide sequence encoding the N-methyl transferase of SEQ ID NO:1 and having the N-methyl transferase enzyme activities of 7-methylxanthine N3 methyl transferase, theobromine N1 methyl transferase, and paraxanthine N3 methyl transferase, where the polypeptide

encoded by said modified nucleotide sequence maintains all of said N-methyl transferase enzyme activities.

Claim 36. (Previously Presented) The isolated RNA molecule of claim 35, wherein said modified nucleotide sequence encodes the polypeptide of SEQ ID NO:1.

Claim 37. Canceled.

Claim 38. (Previously Presented) The isolated RNA molecule of claim 34, wherein said isolated RNA molecule consists of SEQ ID NO:3.

Claim 39. (Previously Presented) An expression vector comprising the DNA molecule of claim 29 and a plant promoter, wherein said vector expresses N-methyl transferase in plant cells.

Claim 40. (Previously Presented) An expression vector comprising the DNA molecule of claim 30 and a plant promoter for expressing an N-methyl transferase encoded by the DNA molecule in plant cells.

Claim 41. (Previously Presented) A vector comprising the DNA molecule of claim 29.

- Claim 42. (Previously Presented) A vector comprising the DNA molecule of claim 30.
- Claim 43. (Previously Presented) The vector of claim 41, wherein said vector expresses an N-methyl transferase with 7-methyl xanthine N3 methyl transferase, theobromine N1 methyl transferase, and paraxanthine N3 methyl transferase activities in cells of at least one microorganism or plant.
- Claim 44 (Previously Presented) The vector of claim 42, wherein said vector expresses an N-methyl transferase with 7-methyl xanthine N3 methyl transferase, theobromine N1 methyl transferase, and paraxanthine N3 methyl transferase activities in cells of at least one microorganism or plant.
- Claim 45 (Previously Presented) A plant cell, plant tissue, or whole plant, wherein said plant cell, plant tissue, or whole plant is transformed with the vector of claim 41 or 43.
- Claim 46. (Previously Presented) A plant cell, plant tissue, or whole plant, wherein said plant cell, plant tissue, or whole plant is transformed with the vector of claim 42 or 44.

- Claim 47. (Previously Presented) The plant cell, plant tissue, or whole plant of claim 45, wherein said vector is introduced by infection.
- Claim 48. (Previously Presented) The plant cell, plant tissue, or whole plant of claim 46, wherein said vector is introduced by infection.
- Claim 49. (Previously Presented) A method for producing a plant secondary metabolite selected from the group consisting of 7-methyl xanthine, paraxanthine, theobromine, and caffeine wherein said method comprises
- culturing the transformed plant cell, plant tissue, or whole plant of claim 45 to form a plant body, and
- culturing said plant body to produce a plant secondary metabolite,
- wherein said plant cell, plant tissue, or whole plant is a Camellia or a Coffea plant cell, plant tissue, or whole plant.
- Claim 50. (Previously Presented) A method for modifying the concentration of caffeine in a cell wherein said method comprises:
- culturing said plant cell or plant tissue of claim 45 to form a plant body, and
- culturing said plant body to modify the concentration of caffeine,

wherein said plant cell or plant tissue is a Camellia or a Coffea plant cell or plant tissue.

- Claim 51. (Currently Amended) The method of claim 49, wherein said ~~a~~ transformed whole plant is a cultured Camellia plant or a cultured Coffea plant.
- Claim 52. (Previously Presented) A vector encoding the RNA molecule of claim 34.
- Claim 53. (Previously Presented) A vector encoding the RNA molecule of claim 35.
- Claim 54. (Currently Amended) The isolated DNA molecule of Claim 30, wherein said modified nucleotide sequence has at least 90% identity to the nucleotide sequence of Claim 29 a nucleotide sequence encoding an N-methyl transferase of SEQ ID NO:1 and having the N-methyl transferase enzyme activities of 7-methylxanthine N3 methyl transferase, theobromine N1 methyl transferase, and paraxanthine N3 methyl transferase.

Claim 55. (Currently Amended) The isolated RNA molecule of Claim 35, wherein said modified nucleotide sequence has at least 95% identity to ~~the nucleotide sequence of Claim 34~~ a nucleotide sequence encoding an N-methyl transferase of SEQ ID NO:1 and having the N-methyl transferase enzyme activities of 7-methylxanthine N3 methyl transferase, theobromine N1 methyl transferase, and paraxanthine N3 methyl transferase.